# CLAIMS

What is claimed is:

1. A method of compensating for color variation due to temperature change in an LED based lighting system having at least one LED array, wherein same color LEDs are electrically connected to form LED channels, the method comprising:

determining a pulse width needed for at least one LED channel to achieve a predetermined target color at at least a first and a second temperature;

calculating a pulse width correction factor for the at least one LED channel based on the pulse width needed to achieve the predetermined target color at the at least first and second temperatures;

correcting the pulse width for the at least one LED channel using the pulse width correction factor to achieve the predetermined target color.

2. The method according to claim 1, wherein the pulse width correction factor is calculated for every LED array in the LED based lighting system.

3. The method according to claim 1, wherein the pulse width correction factor is calculated for some of the LED arrays in the LED based lighting system and then applied to other LED arrays in the LED based lighting system.

4. The method according to claim 1, further comprising calibrating the LED channels, including (a) maximizing an intensity level of one of the LED channels, and (b)

adjusting an intensity level of at least one other LED channel until the predetermined target color is achieved.

5. The method according to claim 4, wherein the calibrating step further includes repeating steps (a) and (b) after a predetermined amount of time.

6. The method according to claim 1, wherein the first operating temperature is a calibration temperature.

7. The method according to claim 6, wherein the second operating temperature is less than the first operating temperature.

8. The method according to claim 6, wherein the second operating temperature is greater than the first operating temperature.

9. The method according to claim 4, further comprising detecting an operating temperature of the at least one LED array, wherein the step of correcting is performed only if a difference between the calibration temperature and the operating temperature is above a predefined threshold value.

10. The method according to claim 1, wherein the target color is defined by chromaticity coordinates.

11. An LED based lighting system with thermal compensation capability, comprising:

at least one LED array having same color LEDs electrically connected to form LED channels;

a microprocessor connected to and independently controlling each LED channel of the LED array to achieve a desired resultant color;

a temperature sensor connected to the microprocessor for detecting an operating temperature of the at least one LED array;

an algorithm stored on the microprocessor configured to cause the microprocessor to compensate for differences in the operating temperature of the at least one LED array.

12. The system of claim 11, wherein the algorithm causes microprocessor to compensate for differences in an operating temperature of the at least one LED array by causing the microprocessor to:

receive the desired resultant color;

apply pulse-width modulation to each LED channel, the pulse-width modulation having a pulse width calibrated to achieve to the resultant color;

monitor an operating temperature for the at least one LED array;

calculate a temperature difference between the operating temperature and a calibration temperature; and

adjust the pulse width of the pulse-width modulation for at least one LED channel based on the temperature difference.

13. The system of claim 12, wherein the algorithm is further configured to cause the microprocessor to wait a predetermined amount of time for the LED array to stabilize before detecting an operating temperature.

14. The system of claim 11, wherein the temperature sensor is an on-board temperature sensor that is built into the microprocessor.

15. The system of claim 11, wherein the LED arrays are installed as an transportation cabin lighting system.

16. The system of claim 12, wherein the microprocessor adjusts the pulse width of the pulse-width modulation using a correction factor for each LED channel.

17. The system of claim 16, wherein the correction factor for each LED channel is calculated from actual data measured for the LED channel.

18. The system of claim 16, wherein the correction factor for each LED channel is estimated from data measured for one or more other LED channels.

19. The system of claim 12, wherein the microprocessor adjusts the pulse width of the pulse-width modulation using a look-up table.

20. A method of compensating for color variation due to temperature change in an LED based lighting system having at least one LED array, wherein same color LEDs are electrically connected to form LED channels, the method comprising:

deriving a temperature compensation curve for the LED array;

calculating a correction factor for at least one LED channel based on temperature compensation curve; and

compensating for differences in an operating temperature for the LED array.

21. The method of claim 20, wherein the step of compensating includes correcting a pulse width for the at least one LED channel using the correction factor.

22. The method according to claim 20, wherein the compensation curve is a pulse width versus temperature curve, further comprising determining the slope of the pulse width versus temperature curve.

23. The method according to claim 22, wherein the slope of the pulse width versus temperature curve is determined by averaging data from a predetermined number of LED channels.

24. The method according to claim 22, wherein the pulse width versus temperature curve is determined based on at least two data points.

25. The method according to claim 20, wherein the step of compensation is performed only if a difference between an operating temperature and a calibration temperature is above a predefined threshold value.

26. A method of calibrating an LED based lighting system having at least one LED array, wherein same color LEDs are electrically connected to form LED channels, the method comprising:

(a) stabilizing the LED channels;

(b) maximizing an intensity level of one of the LED channels;

(c) adjusting an intensity level of at least one other LED channel until a predetermined target color is achieved; and

(d) repeating steps (a)-(c) after a predetermined amount of time.